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Space Administration

HOSC-PLAN-635  
BASELINE  
EFFECTIVE DATE: October 31, 2000

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**George C. Marshall Space Flight Center**  
Marshall Space Flight Center, Alabama 35812

FD40

FLIGHT PROJECTS DIRECTORATE  
GROUND SYSTEMS DEPARTMENT

# HOSC PROJECT RISK MANAGEMENT PLAN

BASELINE

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MSFC - Form 454 (Rev. October 1992)

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## HUNTSVILLE OPERATIONS SUPPORT CENTER PROJECT PLAN

### SIGNATURE PAGE

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### DOCUMENT HISTORY LOG

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## 1. SCOPE/PURPOSE

The purpose of this document is to define the Ground Systems Department (GSD) risk management process applied to the Huntsville Operations Support Center (HOSC) Project. The HOSC Project consists of development and sustaining engineering of mission ground facilities and systems for the following programs: International Space Station (ISS), Chandra X-Ray Observatory (CXO), Microgravity and Shuttle.

## 2. APPLICABLE DOCUMENTS

NPG 7120.5B	NASA Program and Project Management Processes and Requirements
MPG 1050.1	Contract (Customer Agreement) Review
HOSC-PLAN-TBD	Quality Plan for the HOSC Project

## 3. DEFINITIONS/ACRONYMS

Risk. The combination of (1) the probability (qualitative or quantitative) that a program or project will experience an undesired event such as cost overrun, schedule slippage, safety mishap, or failure to achieve technical performance requirement; and (2) the consequences, impact, or severity of the undesired event if it were to occur.

Risk Management. An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risk to increase the likelihood of achieving program/project goals.

CXO	Chandra X-Ray Observatory
GSD	Ground Systems Department
HMCG	HOSC Management Coordination Group
HOSC	Huntsville Operations Support Center
ISS	International Space Station
PMC	Program Management Council
RRB	Risk Review Board
RIAF	Risk Identification Analysis Form
RMDB	Risk Management Database
FMEA	Failure Modes and Effects Analysis
FTA	Fault Tree Analysis
TPM	Technical Performance Measures

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## 4. INTRODUCTION

HOSC Project risk management is in accordance with the requirements of NPG 7120.5B. For the HOSC Project, resources shall be allocated in the management and the abatement of project risks in the following order of priority:

- 1) Mission and personnel safety
- 2) Information security
- 3) Timely/complete delivery of customer requirements, and assurance of the effectivity of quality processes.

### 4.1 OVERVIEW OF PROCESS

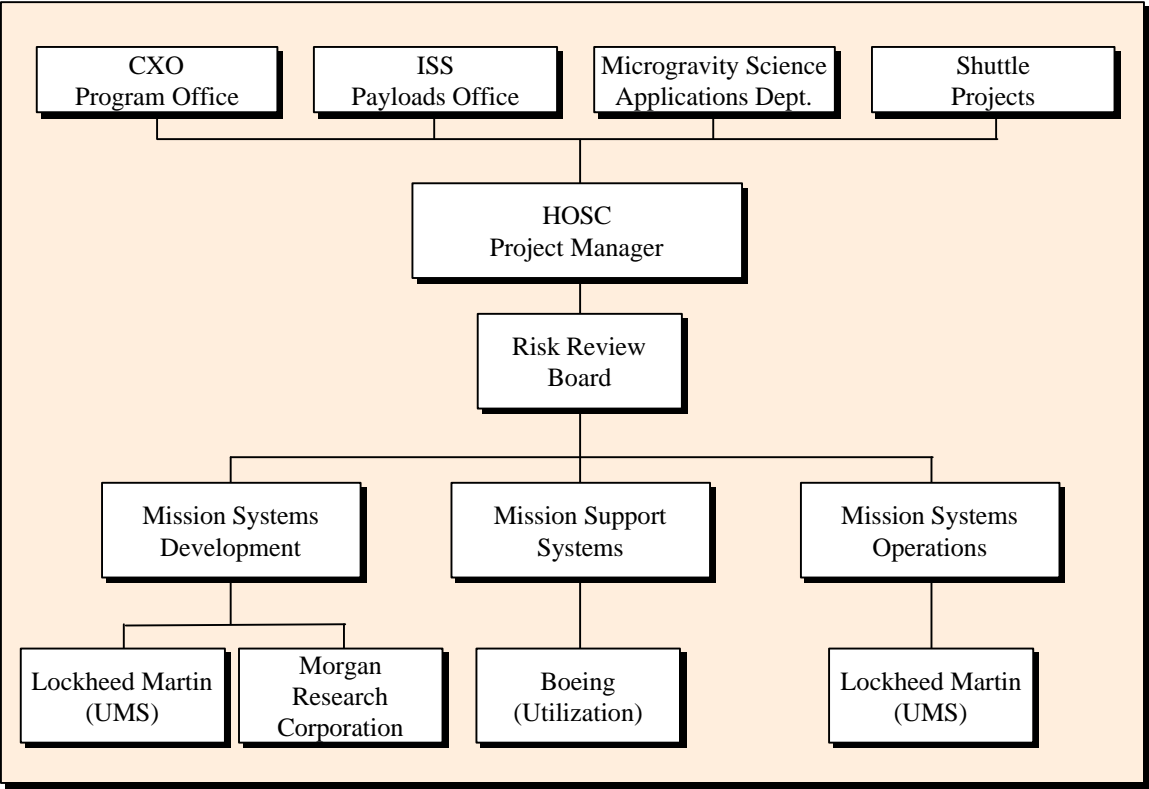
GSD risk management is executed for the HOSC Project development, maintenance and operations phases. These activities are carried out for multiple programs, but a single process and review board are used within the GSD to manage these multi-program risks.

Most risks are managed internal to the HOSC Project, but in some cases risks are elevated to the appropriate Program Office risk management process because of criticality and/or inability to manage the mitigation of the risk at the HOSC Project level. Examples of such risks are delivery of vehicle interface definitions (Interface Control Documents (ICDs)), project databases, etc.

### 4.2 PROGRAM RISK MANAGEMENT/ORGANIZATION FLOW

The hierarchy of risk management process flow between the HOSC Project customers, the GSD organization and the GSD development contractors are illustrated in Figure 4.2-1. The HOSC Project Risk Review Board applies its expertise toward the identification and control of project risks, using the process described in Section 4.3. As appropriate, risks which cannot be mitigated by the HOSC Project are forwarded to the effected project office for resolution.

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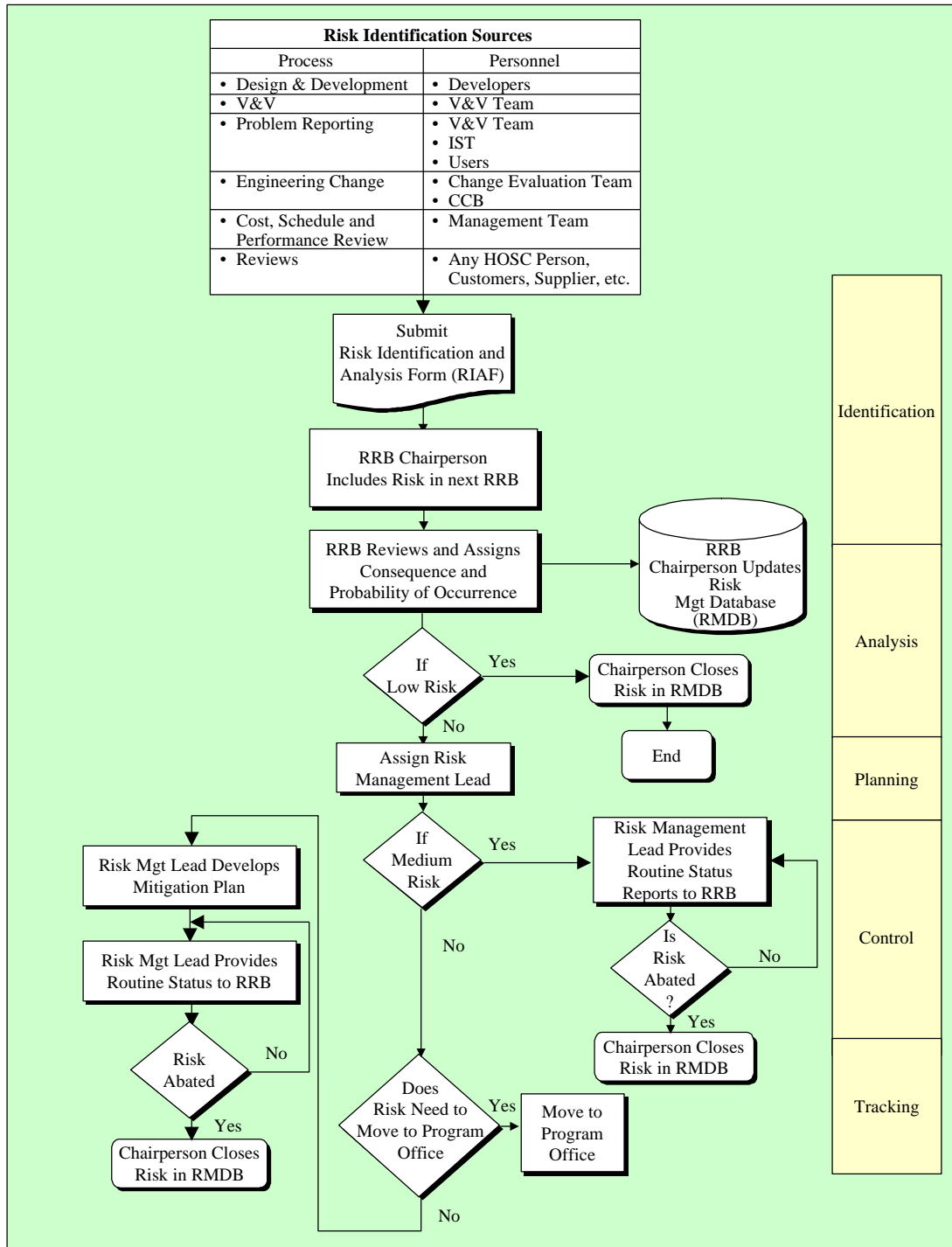


**Figure 4.2-1. HOSC Project Risk Management Flow**

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### 4.3 PROCESS DETAILS

The risk management process and procedure are illustrated in Figure 4.3-1.



**Figure 4.3-1. Risk Management Process**

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Risks are **identified** in the customer reviews and in project performance activities, such as verification and validation, engineering change control and in regular GSD technical/management reviews, as shown in Figure 4.3-1. Identified risks are documented using the Risk Identification and Analysis Form (RIAF) included as Appendix A. The person identifying a risk completes the "Title" and "Description" fields of the RIAF, forwards it to the RRB Chairperson, and discusses/explains it at the next RRB meeting.

The GSD RRB members include personnel from the GSD management staff, GSD Group Leads, representatives from the required GSD contractors, and a representative of the ISS Payload Operations Integration Function (POIF) cadre as shown in Figure 4.3-2. The GSD RRB meets twice per month.

Risk Review Board Membership	
RRB Chairperson	
Group Lead, Mission Systems Development	
Group Lead, Mission Systems Operations	
Group Lead, Mission Support Systems	
Utilization Mission Services Contract Representative	
Boeing Space and Communications Contract Representative	
ISS POIF Representative	

**Figure 4.3-2. HOSC Project RRB Members**

The RRB performs initial risk analysis/categorization and initiates tracking in the Risk Management Database (RMDB). The primary risk analysis **methods** and **tools** used are Fault Tree Analysis (FTA), Cost/Schedule trending and categorization. Risks are categorized based on their likelihood level and their consequence level as shown on the RIAF. Risk likelihood descriptions and levels are defined in Figure 4.3-3.

<i>Likelihood</i>	<i>What is the likelihood the situation or circumstance will happen?</i>		
	<b>Level</b>	<b>Description</b>	<b>.or -the current process ...</b>
	5	Very High	cannot prevent this event, no alternate approaches or processes are available.
	4	High	cannot prevent this event, but a different approach or process might.
	3	Moderate	may prevent this event, but additional actions will be required.
	2	Low	is usually sufficient to prevent this type of event.
	1	Very Low	is sufficient to prevent this event.

**Figure 4.3-3. Risk Likelihood Categories**

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Implementation risk impact/consequence is expressed in terms of five levels across the principal metrics as shown in Figure 4.3-4. In general, Categories 1-3 are representative of internal impacts which can be avoided/absorbed. Category 4 and 5 impacts are generally external as they affect the customer and cannot be internally avoided/absorbed.

<i>Given the event occurs, what is the impact to the Customer? ...</i>						
<b>Consequences</b>	<b>Level ↻</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	Technical	Minimal or No Impact	Moderate Reduction, Same Approach Retained	Moderate Reduction, but Workarounds Available	Major Reduction, but Workarounds Available	Unacceptable, No Alternatives Exist
	Schedule	Minimal or No Impact	Additional Activities Required, Able to Meet Need Dates	Program Milestone Slip of $\leq 2$ Weeks	Program Milestone Slip of $> 2$ Weeks, or Program Critical Path Impacted	Cannot Achieve Major Program Milestone
	Cost (% of Customer's Annual HOSC Budget)	Minimal Impact of $< 0.5\%$	Budget Increase of $\geq 1\%$ , and $< 1.5\%$	Budget Increase of $\geq 1\%$ , and $< 1.5\%$	Budget Increase of $\geq 1.5\%$ , and $< 2\%$	Budget Increase of $> 2\%$

**Figure 4.3-4. Risk Consequence Levels**

Risks are categorized by applying the likelihood and consequence levels to the matrix of Figure 4.3-5.

When risks are analyzed and determined to be "unacceptable", i.e., "high" or "medium" using the matrix of Figure 4.3-5, a risk management lead is assigned to manage and mitigate the risk. For risks which are assessed as falling in the "medium" category, the risk management lead performs surveillance of the risk and reports routine status to the RRB. Based on information provided during the routine status reports, the RRB may determine at a future time that the likelihood or consequence of the risk's occurrence has increased thereby elevating the risk to "high". For risks categorized as "high", the risk management lead prepares a detailed risk mitigation plan (as shown on page 2 of the RIAF) which is reviewed and concurred in by the RRB. The resulting mitigation plan defines the

Risk Matrix					
Likelihood	5	4	3	2	1
Consequences					
	1	2	3	4	5

Category

High - Implement new process(es) or change baseline plan(s)

Med - Aggressively manage; consider alternative process

Low - Monitor

**Figure 4.3-5. Risk Matrix**

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actions to be taken to reduce the probability of occurrence and/or the consequences of the risk should it occur. Emphasis is placed on defining **metrics/closure criteria**, which can be used to clearly track progress in risk mitigation. The RRB authorizes resources required for execution of the risk management plan. The plan is then executed by the risk management lead, with routine status provided to the RRB. Likelihood, consequence and category levels are updated for each risk for each RRB review meeting – using the RIAF. Risk categories generally decrease as the mitigation plan steps are completed. When the category for any risk is ranked as "low", it is closed.

At the conclusion of each RRB meeting, the RRB ranks all open risks relative to each other, so that available resources are consistently applied to those risks demanding highest priority.

#### 4.4 RESOURCES AND SCHEDULE

Risk management resources comprise those things that the Project may expend in the process of mitigating risk. These include:

- 1) Reassignment of work among civil service and/or contractor organizations, and
- 2) Review and adjustment of technical and/or management processes.

Note, the HOSC Project does not maintain budget or schedule reserves.

The RRB meets twice monthly to review the status of risk mitigation activities. In addition, the RRB is convened at the convenience of the GSD Manager to address risk issues, as they are identified.

#### 4.5 DOCUMENTATION OF RISKS

Risks are documented and tracked using the process defined in Section 4.3.

#### 4.6 DESCOPE METHODOLOGY

At the current point in the Project, wherein all of the facilities, systems, and operations procedures are either operational or in advanced stages of development, descope methodology is unnecessary.

### 5. RECORDS

Risk management records are maintained by the RRB Chairperson in the RMDB throughout the life of the HOSC Project.

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## APPENDIX A – RISK IDENTIFICATION AND ANALYSIS FORM

<b><i>RISK SUMMARY</i></b>				Status as of:	
Title:				Number:	
Description:					
GSD Mgt. Org.:		HOSC Risk Mgt. Lead:		Externally Managed by:	
Estimated Closure Date (ECD):			Actual Closure Date (ACD):		
Flights Affected:			ROM Cost (\$K):		
Likelihood Level: [   ]	Consequence Levels: Technical [   ] Schedule [   ] Cost [   ]			Category: (High, Medium, Low) [   ]	
Ranking Among Other Risks:		Ranking Rationale:			
Impact / Consequence:					
Mitigation Plan Overview:					
Closure/Acceptance Criteria:					
Closure/Acceptance Rationale:					

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**Figure A-1. Risk Identification and Analysis Form (Page 1 of 2)**

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**Status as of Review Date**  
 (Indicate: (1) Step ACDs, (2) Current Overall Levels and Category)

## *MITIGATION PLAN*

Step
Step Description
Resp. Org.
ECD
ACD

Likelihood Level

Consequence Level - Technical

Consequence Level - Schedule

Consequence Level - Cost

Category

Status Description

**Figure A-2. Risk Identification and Analysis Form (Page 2 of 2)**